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AUTHOR Sitkei, E. George
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ABSTRACT

This report reviews past research on the subject of class size and arrives at a summary of findings that may either aid further research or provide some basis for administrative decisions. The findings touch upon many phases of administrative responsibility and have immediate cost and quality implications. Tables and a bibliography are provided. (JF)

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THE EFFECTS OF CLASS SIZE: A REVIEW OF THE RESEARCH

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Prepared by
Dr. E. George Sitkei

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Research Report

THE EFFECTS OF CLASS SIZE: A REVIEW OF THE RESEARCH

Introduction

The study of optimum class size for schools in the U.S. has been an important issue from year to year. Some schools have made considerable improvement but it is generally conceded there has been slow progress in making needed changes in the teacher-pupil ratio. One contributing factor may be the financial commitment that is necessary to decrease the established ratio by even one pupil. In education, when the problem of teacher-pupil ratio and teacher salaries have been settled, as much as 80 per cent of the educational budget has been consumed. A popular misconception is that increased enrollments are directly related to housing. Actually, building expenditures are only a small percentage of the cost of education; current expenses, day-to-day costs of running a school, are the big costs.

The history of the frequency of class-size studies seems to reflect the contemporary socio-economic conditions. With increasing enrollments and rising price levels occuring simultaneously, a renewed interest is aroused in research on class size. Quite a number of studies appeared after the turn of the twentieth century, a decrease occured immediately after World War I, and renewed effort to give some empirical answers was noted in the late twenties. The depression era saw a dearth of interest in this problem. Today, in an era of affluent times, the problem of obtaining qualified teachers is one of the elements hampering the movement to decrease class size.

A Matter of Definition

The manner of reporting class size has been inconsistent, and consequently, comparisons have been difficult to make. Reporting the ratio of the numerical staff adequacy and class size can be done in two ways: number of staff members per thousand students and pupil-teacher (staff) ratio. The use of numerical staff adequacy and class size statistics interchangeably is a source of confusion. For example, some school districts may report the number of certificated staff members per thousand students. Some may view it as a ratio of pupils to teachers with assigned classroom duties. Others consider it as the number of pupils per class.

A definition of a "class" is also difficult to define. If a class is any group of students scheduled to meet regularly for all or a definite fraction of a school day with one particular teacher, then this could include regularly scheduled remedial classes (usually very small) as well as large coaching groups, band rehearsals, and perhaps, even student council meetings. To systematize the handling of these variables, some highly arbitrary and uniform decisions on how statistics are weighted and combined must be used.

To eliminate the confusion and use of spurious measures in determining the nature of class size and numerical staff adequacy, a few generalizations have to be accepted. A consideration of these generalizations is presented here:

1. Average class size and numerical staff adequacy of school systems are not highly related. Only about 36 per cent of the variation among school systems in numerical staff adequacy can be accounted for by variation in average class size. There are some schools that have large classes and many ancillary personnel and others where only the superintendent is hired to do anything other than teach classes.

2. High school and elementary school class-size statistics should never be combined. High school class size has little relationship to elementary class size in the same school district.

3. There is more variation in actual class size within systems than among averages of systems of a state or a region. An average class size of twenty-five for a high school is no assurance that there will not be physical education and music classes over ninety and French and trigometry classes of under ten.

4. A small class or a large class is what the researcher or respondent thinks it is. There have been studies where "small" classes were anything under forty and "large" classes anything over fifty. There have been other studies where "small" classes were defined as having less than fifteen students and "large" classes more than twenty-five. The Metropolitan School Study Council studies have tended to set twenty to twenty-five as the upper limit of small classes and thirty to thirty-five as the lower limit of large classes.

The question about wisdom in setting class size policy is concerned with "class size for what end and under what circumstance?" It is probably impossible to bring together concensus that a single, optimum, class-size integer or range can be set up for any or all school systems. A number of variables must be considered in deciding whether or not a piece of research applies to any selected school system. The school administrator must be aware of the researcher's definition of class size, and the criterion upon which the study is based, i.e., if it was found that twenty was an ideal class size for teaching arithmetic, would this same figure apply to the teaching of another subject?

Past Research

The opening wedge into what might be considered a modern study of the class size question was an inquiry by Dr. Rice (the first spelling test) who, in 1903, looked into the effect of class size variation on arithmetic achievement. Since that time over 300 separate writings have dealt with the research problem of class size.

Blake, in 1954, made a summary of a selected number of studies in elementary and secondary schools concerned with attitudes of class size. After eliminating (1) those dealing with other levels or other types of institutions than public schools and (2) those that were not reports of original research (i.e., compilations, status reports, editorials, or philosophical discussions), the net result was 85 studies that met his rather generous definition of research studies on class size in public schools. An analysis of these studies gave the following results:

The smaller the better	35
The bigger the better	18
Inconclusive results	32

Thus, the weight of evidence favored small classes by about two to one. Blake carried the analysis further by establishing six major criteria for a study to fulfill before being included. As a result, only 22 studies were considered acceptable but now the ratio of studies favoring small classes had been strengthened to five to one. Sixteen (72%) favored small classes, three (14%) favored large, and three (14%) were inconclusive.

In general, studies have been directed toward areas of interest, i.e., effect of class size on pupil achievement, effect on teaching methods, and effect on how much teachers know about their pupils. Richman, in a sophisticated study in 1955 was able to demonstrate that a number of schoolroom practices are affected when class size is maintained at 25 pupils per teacher. Small groupings led to the following practices:

1. Increased opportunities for children to select learning materials
2. Increased face-to-face relationships between teacher and pupils
3. Increased knowledge by teachers of their pupils' individual abilities
4. Increased knowledge by teachers of pupil potential
5. Increased teacher attention to informal pupil guidance
6. Increased teacher attention to observing non-overt pupil behavior denoting emotional instability
7. Increased work with the gifted and with the slow
8. Increased attention to grouping and greater flexibility of grouping.

Where class size had been increased in this investigation, Richman found the converse to be true-- these same kinds of practices were used with less frequency and consistency. The situation "hardened" since it was inevitable that teachers had to take refuge in routine procedures involved with instilling children with drills in fundamental skills.

Another investigation by McKenna at Columbia University substantiated many of the findings of Richman. In addition, it was found that small classes:

1. produced more educational creativity
2. allowed for more variety in instructional methods
3. gave more time for individualized methods
4. allowed the teacher more opportunity to observe children, keep records on child behavior, and conduct good parent conferences.

By adding class-size and numerical staff adequacy statistics to a combination of quality-controlling factors of school systems, McKenna further discovered that the quantity measure of staff which assisted most in predicting quality scores was total number of professional staff members (including teachers, administrators, supervisors, nurses, guidance workers, and other specialists per thousand students).

Binion found that class sizes that deviated too markedly from that which might be expected of a system, knowing its expenditure position and spending pattern, tended to have a negative result. Thus, if an administrator robs everything else to get small classes, he gets little indeed in the way of instructional quality. If on the other hand he spends heavily to select and hold expert teachers, gives them all they ask for, but does it at a cost of too few people for the number of students, this too will provide him with less than he has reason to expect for that total expenditure.

Concentrating on the effects of large groups vs small groups on social traits, Cannon compared kindergarten children in classes of 23-28 and 34-39 pupils. A description of reactions in the large group is highly informative:

> "More aggressive acts were found and recorded in the large group than in the small group; evidence of more pushing, bumping, crowding and striking was found in the large class, where there was considerable waiting for use of equipment and a longer time between turns at a favorite activity. A high level of frustration appeared to advance the general climate of aggressive behavior. The teacher had fewer opportunities to guide children individually in order to minimize negative action. Without the teacher's influence, conduct generally became more aggressive. (Cannon: 10)

In contrast, the small group atmosphere was considerably more conducive to the achievement of more fully integrated group relationships. Children made friends more easily, responding to the more relaxed and permissive atmosphere. With a sense of belonging, they felt more secure, made the adjustment to group living more readily, and were more patient and helpful to one another. The quality of classroom living, as shown by child-teacher contacts, was much higher in the small group. Although not all class activities suggested great differences, it is most obvious in observed activities during block building and playhouse activities. The climate of the small group seemed to foster a greater variety of creative, dramatic, and social experiences. By direct comparison, a higher percentage of the large group participants chose drawing at tables, probably because of less opportunity to use other materials and equipment. The tempo of the large group--more noise, greater excitement and less permissive atmosphere--was less conducive to cooperative, creative play.

The availability of the teacher to be a more significant person in the life of the child was more evident in the small group. A record of the teacher's feelings and reactions, as noted in a daily diary, disclosed that the large group was often termed hard, noisy, chaotic with the teacher exhausted by the end of the day. Because of the greater stimulating effect of one child on another, each child had to speak a little louder to be heard, be more demanding of his own desires, and wait longer for privileges or turns. The inevitable result was more noise, more aggression, and tired children at the end of the day.

The entries in the diary about the small group teacher reactions were of a different nature. The small group was described as affectionate, relaxed and productive; the children were observed to be more spontaneous, creative and happy. In all areas studied, the teachers experienced greater satisfaction, more enjoyment and a higher sense of achievement when working with the smaller group.

A 1964 study by Frymier involving over 400 pupils in 15 classes was concerned with the effects of class size upon reading achievement in first grade. The results again confirmed what other similar studies have shown in terms of significant differences for achievement but this study gave an additional insight into an area that has had little investigation. It was discovered that fewer retentions resulted in the smaller classes, and this despite the fact that their attendance record was somewhat poorer than for those enrolled in larger groups. The author briefly focused upon this issue and raised the question concerning the cost of re-teaching pupils who are retained one year or more in school for lack of achievement in reading apparently incurred as a result of an experience in too large a class. Further research might provide evidence that monetary loss as well as the psychological effect of retention on the child are strong negative factors incurred as a result of overcrowded classrooms.

In the literature there are some studies that seem to have shown that large classes do not adversely effect learning of the factual subjects. Most of these were experiments with high school and college level students enrolled in courses in which the lecture method was primarily employed. Under these conditions the size of the class would have little relationship to achievement as long as the student was given adequate opportunity to hear the lecturer. To accept and act on this kind of evidence means that factual learnings are given top priority. But, it is generally agreed this is not the only goal of education. Concern about the child's personal, creative, and social development, as other studies have indicated, does support a plea for reasonable class sizes.

The question of what constitutes a reasonable class size is under considerable discussion today. An NEA Research Division Poll revealed that teachers and principals are not too far apart in agreement on this issue. The results of this poll were as follows:

Best class size	% of teachers	% of principals
Fewer than 20	12.5	13.8
20-24	53.7	51.7
25-29	31.2	31.6
30-34	2.5	2.9
35 or more	0.1	

In the face of ever-increasing teacher shortages, there are indications that in some places boards of education and school administrators have considered the possibility of increasing pupil-teacher ratios as one means of meeting this shortage. The possibility that efficiency of teaching may not depend primarily on the number of pupils in a classroom is ignored. The focus of the issue needs to be broadened to include all facets of the instructional program. Successful school experiences may hinge upon many factors, such as ability of the teacher, division of pupils into proper instruction groups or units, type of subject matter involved, teaching philosophy, use of visual and aural aids, size and type of classrooms, concept of the role of the teacher, use of teacher aides, and the nature of instruction as determined by pupil needs.

In experimental studies concerned with computer-assisted instruction, no attempt has been made to imply that the teacher can be replaced by a machine. Principally, the emphasis is on having the teacher use the computer as the most sophisticated teaching tool of all, one that, as Dr. Bright, Associate U. S. Commissioner of Education, says, "permits teaching excellence to be the common experience of all students and one which permits each student to progress at his own rate" (Janssen: 73).

In the computerized classroom of the (near) future, the teachers role will change. He will be concerned with the development, convictions, and social actions of his students. This will allow the teacher to be student-oriented, not subject oriented. Under these conditions, with immediate access to the newer educational media, class-size, per se, will probably not receive as much attention at that time as it does today.

The ratio of teacher to pupils generally seems now to be roughly about one to thirty. This number is probably too large if thirty pupils of varying ability must be taught as a group in the usual classroom, and with the teacher carrying all the responsibilities involved regardless of their relative importance. It is conceded that on a ratio of one teacher to thirty pupils, a serious teacher shortage will develop generally throughout the country in the next few years.

A survey by the California State Department of Education and the California Teachers Association in 1963 disclosed the following facts about class size:

The median class size of double session kindergarten classes was 30
The median class size of elementary schools was 32
The median average class size for academic classes in junior high schools was 32.2
The median average class size for the industrial, vocational, and fine arts classes in junior high schools was 25.7
The median average class size for academic classes in the senior high schools was 31.2
The median average class size for the industrial, vocational and fine arts classes in the senior high schools was 24

A more recent CTA Bulletin (No. 196) gives less detailed information, but reports on class size for the year 1965-66. Tables A & B present the findings in relation to the ADA level for elementary and high school classes.

TABLE A

AVERAGE CLASS SIZES IN ELEMENTARY SCHOOL CLASSES 1965-1966

ADA Level	Elementary School Districts	Elementary Classes In Unified and Common Administration Districts
Under 100	17.3	16.4
100-499	25.9	21.2
500-999	27.6	26.1
1,000-1,999	28.6	26.7
2,000-3,999	28.5	27.9
4,000-9,999	29.4	29.1
10,000-24,999	29.8	29.8
25,000 & Over	----	30.8
ALL DISTRICTS	28.7	30.0

ALL ELEMENTARY SCHOOL CLASSES 29.4

TABLE B

AVERAGE CLASS SIZES IN HIGH SCHOOL CLASSES 1965-1966

ADA Level	High School Districts	High School Classes In Unified and Common Administration Districts
100-499	21.6	15.1
500-999	24.7	20.5
1,000-1,999	26.1	24.5
2,000-3,999	27.0	26.3
4,000-9,999	28.0	28.1
10,000-24,999	28.0	28.0
25,000 & Over	----	29.4
ALL DISTRICTS	27.2	28.6

ALL HIGH SCHOOL CLASSES 28.3

The class sizes as denoted by this table were reported in accordance with regulations issued by the Superintendent of Public Instruction. Therefore, the figures do not include the following:

a. Classes in art, instrumental and vocational music, industrial arts, vocational arts, and physical education in grades K-8.

b. Classes in commercial arts, instrumental and vocational music, industrial arts, vocational arts, and physical education in grades 9-12.

c. In grades 9-12, class sessions for which two or more individual class groups are assembled together in the same room for joint lectures or demonstrations.

The CTA Research Bulletin (No. 223) for May 1968 gives average class sizes for elementary and secondary classes in the school year 1967-68 (see Tables C and D). When compared to previous data, a decline in class size is evident in California with the high school districts containing approximately one less pupil per class than the elementary district classes. Distribution of classes with over 35 pupils, as shown in Tables E and F, verifies the findings that large school districts continue to have a greater proportion of the larger classes.

TABLE C

AVERAGE CLASS SIZES IN ELEMENTARY SCHOOL CLASSES 1967-1968

ADA Level	Elementary Classes In Unified and Common Administration Districts	Elementary School Districts
25,000 & Over	28.9	----
10,000-24,999	28.7	29.1
4,000-9,999	28.1	28.4
2,000-3,999	27.0	27.5
1,000-1,999	26.3	27.6
500-999	24.9	27.1
100-499	20.6	25.0
Under 100	22.5	16.2
ALL DISTRICTS	28.5	28.0

ALL ELEMENTARY SCHOOL CLASSES 28.3

TABLE D

AVERAGE CLASS SIZES IN HIGH SCHOOL CLASSES 1967-1968

ADA Level	High School Classes In Unified and Common Administration Districts	High School Districts
25,000 & Over	28.7	----
10,000-24,999	27.4	28.1
4,000-9,999	26.7	27.5
2,000-3,999	25.1	26.7
1,000-1,999	23.2	25.4
500-999	19.2	23.6
100-499	16.2	20.4
ALL DISTRICTS	27.5	27.2

ALL HIGH SCHOOL CLASSES 27.4

TABLE E

DISTRIBUTION OF CLASSES OVER 35 PUPILS 1967-1968

ADA Level	Elementary Classes In Unified and Common Administration Districts		Elementary School Districts	
	No. of Classes	Percent	No. of Classes	Percent
25,000 & Over	3,450	9.40	-	----
10,000-24,999	1,225	6.32	1,152	8.40
4,000-9,999	489	3.94	690	4.51
2,000-3,999	172	3.88	283	3.48
1,000-1,999	44	2.60	183	3.76
500-999	24	4.31	69	3.55
100-499	4	1.09	133	4.86
Under 100	-	----	2	0.34
TOTAL	5,408	7.18	2,512	5.31

ALL ELEMENTARY SCHOOL CLASSES 7,920 6.46

TABLE F

DISTRIBUTION OF CLASSES OVER 35 PUPILS 1967-1968

ADA Level	High School Classes In Unified and Common Administration Districts		High School Districts	
	No. of Classes	Percent	No. of Classes	Percent
25,000 & Over	6,933	13.10	-	----
10,000-24,999	3,239	8.69	2,539	9.89
4,000-9,999	1,912	8.52	1,676	10.23
2,000-3,999	340	5.18	466	7.73
1,000-1,999	163	4.73	349	6.65
500-999	19	1.88	80	3.18
100-499	5	0.84	57	5.06
TOTAL	12,611	10.15	5,477	9.61

ALL HIGH SCHOOL CLASSES 18,088 9.98

An NEA Research Report (1965 - R11, July 1965) reports the following average elementary class size nationally for all districts enrolling more than 3000 students:

1952-53	31.9
1955-56	30.4
1957-58	30.1
1959-60	29.5
1961-62	29.6
1964-65	29.3

Conclusion

A summary by Ross (1958) lists a number of prudent recommendations for administrators to consider when faced with the issue of establishing class sizes. Bearing in mind the unique local factors, these generalizations should be given consideration:

1. Don't rob all other items of the budget to reduce class size.
2. Don't overemphasize uniformity in developing class size policy.
3. More imagination and experimentation in school organization and building utilization can relieve the class size factor of having to absorb the whole impact of enrollment out-running facilities.
4. Give teachers the help they need in adjusting to take advantage of small classes and adjusting to mitigate the undesirable effects should class size increase.
5. Be aware that class-size policy established today by administrative decision will have its impact on local traditions that may freeze policy for the future. (Ross:495)

A review of the implications for research from known practices in the determination of class-size covers a broad range. These touch upon almost all phases of administrative responsibilities and have immediate cost and quality implications for a system's class-size policy. Whatever decisions are made on the basis of present research, they are bound to be important ones for educator's to consider. A summary of the findings most pertinent to this investigation are considered here:

1. Although the research studies of class size are not conclusive, there are twice as many studies in favor of smaller classes over larger classes.

2. There is a great deal of variation among school systems and researchers as to what they mean when they speak of a "small" class or a "large" class.

3. There is more variation within systems as to class size than among the averages of systems of a state or a region.

4. Size of system is no predictor of size of elementary school classes, but size of system does directly predict size of high school classes.

5. The evidence would indicate that a general measure of numerical staff adequacy is a better predictor of school quality than average class size.

6. Small classes tend to have more variety in instructional methods used than do large classes.

7. Desirable practices tend to be dropped when class size is increased; desirable practices are added when class size is reduced.

8. The strongest and best supported argument for small classes is that they are a guarantee against "educational accidents."

9. Non-classroom personnel are at least as important as classroom teachers.

10. If the teacher is not informed of changes in class-size policy, the results are poorer than if he is aware of the situation.

11. Class size that deviates too markedly from that which might expected of a system in light of its financial provisions tends to have negative results.

12. Depressions and other socio-economic forces result in decreasing class size, economic prosperity in increasing class size; pressure to increase class size results in a rash of studies on the effects of varying class size.

13. The computerized classroom has potential for freeing the teacher to do the really important things, the things that cannot be done by a book or by a machine. Class size may take on a new reference point and may not be the problem that it is today.

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